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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
09/964,386	09/28/2001	Nurhan Ergun	P21479	3248

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RESTON, VA 20191

EXAMINER

LEUNG, JENNIFER A

ART UNIT	PAPER NUMBER
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1764

DATE MAILED: 12/02/2004

Please find below and/or attached an Office communication concerning this application or proceeding.

Office Action Summary

Application No.

09/964,386

Applicant(s)

ERGUN ET AL.

Examiner

Jennifer A. Leung

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-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --
Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If the period for reply specified above is less than thirty (30) days, a reply within the statutory minimum of thirty (30) days will be considered timely.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

- 1) ☒ Responsive to communication(s) filed on 13 September 2004.
- 2a) ☐ This action is **FINAL**. 2b) ☒ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

- 4) ☒ Claim(s) 1,3-5,13-32 and 35 is/are pending in the application.
- 4a) Of the above claim(s) _____ is/are withdrawn from consideration.
- 5) ☐ Claim(s) _____ is/are allowed.
- 6) ☒ Claim(s) 1,3-5,13-32 and 35 is/are rejected.
- 7) ☐ Claim(s) _____ is/are objected to.
- 8) ☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☐ The drawing(s) filed on _____ is/are: a) ☐ accepted or b) ☐ objected to by the Examiner.
Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).
Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
- 11) ☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

- 12) ☒ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☒ All b) ☐ Some * c) ☐ None of:
1. ☐ Certified copies of the priority documents have been received.
 2. ☒ Certified copies of the priority documents have been received in Application No. 09/530,943.
 3. ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

- 1) ☒ Notice of References Cited (PTO-892)
- 2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
- 3) ☒ Information Disclosure Statement(s) (PTO-1449 or PTO/SB/08)
Paper No(s)/Mail Date 9-13-04.
- 4) ☐ Interview Summary (PTO-413)
Paper No(s)/Mail Date. _____
- 5) ☐ Notice of Informal Patent Application (PTO-152)
- 6) ☐ Other: _____

DETAILED ACTION

Continued Examination Under 37 CFR 1.114

1. A request for continued examination under 37 CFR 1.114, including the fee set forth in 37 CFR 1.17(e), was filed in this application after final rejection. Since this application is eligible for continued examination under 37 CFR 1.114, and the fee set forth in 37 CFR 1.17(e) has been timely paid, the finality of the previous Office action has been withdrawn pursuant to 37 CFR 1.114. Applicant's submission filed on September 13, 2004 has been entered.

Response to Amendment

2. Applicant's amendment submitted on September 13, 2004 has been received and carefully considered. The changes made to the Specification are acceptable. Claims 2, 6-12, 33 and 34 are cancelled. Claims 1, 3-5, 13-32 and 35 remain active.

Claim Rejections - 35 USC § 103

The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

This application currently names joint inventors. In considering patentability of the claims under 35 U.S.C. 103(a), the examiner presumes that the subject matter of the various claims was commonly owned at the time any inventions covered therein were made absent any evidence to the contrary. Applicant is advised of the obligation under 37 CFR 1.56 to point out the inventor and invention dates of each claim that was not commonly owned at the time a later invention was made in order for the examiner to consider the applicability of 35 U.S.C. 103(c) and potential 35 U.S.C. 102(e), (f) or (g) prior art under 35 U.S.C. 103(a).

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3. Claims 1, 3, 5, 25-32 and 35 are rejected under 35 U.S.C. 103(a) as being unpatentable over Bam et al. (US 5,424,467) in view of Assmann et al. (US 5,514,820) **OR** Nouredдини (US 6,015,440).

Regarding claims 1, 3 and 5, Bam et al. (FIG. 1; column 4, line 20 to column 5, line 27) discloses an apparatus comprising:

at least one container for fats (oil storage tank **24**; column 5, lines 35-40);

a tank for alkaline solution (a CATALYST source, inherently contained in a tank or equivalent containing means; column 5, lines 47-52);

a tank for alcohol (alcohol storage tank **20**; column 5, lines 41-46);

a mixing vessel for compounding the alkaline solution and the alcohol (not labeled; see FIG. 1, and column 4, lines 22-25);

a reaction section (i.e., comprising reaction vessel **22**, with moving impeller **44**; column 6, lines 33-62) connected to the at least one container for fats **24** and the mixing vessel through a pump (not shown; see column 7, lines 10-13) for introducing the fats and the alkaline solution to the reaction section; and

a separation unit (i.e., liquid extraction system **26**, or distillation vessel **30**, or dewatering column **34**, or distillation column **36**) downstream from the reaction section **22**.

Although an operating pressure of "up to 200 bar" is not specified for the pump, the pump in the apparatus of Bam et al. meets the claims since the specific pressure at which the pump operates is merely a matter of intended use, and it is well known in the art that pumps are inherently capable of feeding reactants over a wide range of pressures, including the instantly recited pressures, by performing a simple calibration of the pump.

Bam et al., however, is silent as to the reaction section **22** comprising a static mixer.

Assmann et al. teach an apparatus for producing lower alkyl esters (FIG. 1; column 4, lines 41-60), said apparatus comprising a reaction section including a static mixer portion **2** and tube reactor portion **4**, the reaction section being connected to supplies of fats (OIL/FAT), alkaline solution (CATALYST SOLUTION) and alcohol (ALCOHOL).

Noureddini teaches an apparatus for producing biodiesel fuel (FIG. 1, 2a-c; column 7, line 5 to column 8, line 43), the apparatus comprising a reaction section (transesterification unit **1**) connected to supplies of fats (i.e., triglyceride **A**), alkaline solution (i.e., NaOH, KOH, etc. **B**) and alcohol (i.e., methanol **C**), wherein the reaction section **1** comprises, "one or more heated continuously stirred tank reactors(s) (CSTR), *or* one or more tubular reactors(s) with static mixers." (column 7, lines 18-21). The reaction section **1** is shown in detail in FIGS. 2a-c, wherein the reactor comprises one or more heated tubes (i.e., pipes), each optionally containing a static mixer element **SM**, essentially defining a baffle, blade or resistor (column 9, lines 41-60).

It would have been obvious for one of ordinary skill in the art at the time the invention was made to substitute a reaction section containing a static mixer for the reaction section containing an impeller of Bam et al., because the use of a reaction section containing a static mixer minimizes the back-mixing of starting oil, methanol and catalyst, thereby achieving high conversion in shorter residence times, as taught by Assmann et al. Specifically,

"Besides thorough mixing of the starting materials, it is particularly important to the transesterification reaction that no glycerol (reaction product) come into contact with starting oil, methanol and new catalyst (back-mixing) because, if this were the case, the glycerol would partly back-react with the ester to form the mono-, di- and triglyceride. These glycerides would have to be degraded again which would involve increased effort with a relative deterioration of conversion." (column 3, lines 4-19).

Additionally, it would have been obvious for one of ordinary skill in the art at the time the invention was made to substitute a reaction section containing a static mixer for the reaction section containing an impeller in the apparatus of Bam et al., on the basis of suitability for the intended use and absent showing any unexpected results thereof, because the interchange-ability of a reaction section comprising a static mixer with a reaction section comprising a stirred tank for producing fatty acid methyl esters is clearly evidenced by Nouredini, above, and it has been held that the substitution of known equivalent structures merely involves only ordinary skill in the art, *In re Fout* 213 USPQ 532 (CCPA 1982); *In re Susi* 169 USPQ 423 (CCPA 1971); *In re Siebentritt* 152 USPQ 618 (CCPA 1967); *In re Ruff* 118 USPQ 343 (CCPA 1958).

Regarding claim 25, Bam et al. (FIG. 1; column 4, lines 58-67) discloses the separation unit comprises a distillation unit (i.e., extractive distillation vessel 30) comprising at least one evaporator (i.e., vaporization means, shown as a heating coil, not labeled, see FIG. 1) and at least one condenser (i.e., condenser 60).

Regarding claim 26, Bam et al. (FIG. 1; column 4, lines 58-67) discloses a distillation unit (i.e., extractive distillation vessel 30) comprising at least one evaporator (i.e., vaporization means, shown as a heating coil, not labeled, see FIG. 1) and at least one condenser (i.e., condenser 60) downstream of the separation unit (i.e., the liquid extraction system 26).

Regarding claim 27-29, although Bam et al. does not specifically recite a down flow evaporator, a thin layer evaporator or a rotation flow evaporator, the provision of such separation means to the apparatus of Bam would have been obvious to one of ordinary skill in the art at the time the invention was made, given that Bam teaches the liquid extraction system 26 comprising,

“Representative types of extraction units include[ing] mixer settlers, vertical towers of various kinds that operate by *gravity flow*, agitated tower extractors, and *centrifugal*

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extractors. The particular configuration and design of the individual components of a liquid extraction system can be readily ascertained using conventional chemical engineering calculations and techniques.” (column 7, lines 55-63).

Regarding claim 30, Bam et al. (FIG. 1; column 4, lines 58-68) discloses a distillation unit (i.e., distillation vessel **30**) upstream of the separation unit (i.e., the dewatering column **34**).

Regarding claims 31 and 32, Bam et al. (FIG. 1) discloses an additional separation unit **30** downstream from the separation unit **26**, wherein the additional separation unit **30** is connected to the reaction section **22** by a connecting recycle pipe **62**. Although pipe **62** is not shown to connect specifically from the at least one container for fats **24**, it would have been obvious for one of ordinary skill in the art at the time the invention was made to select other appropriate connecting locations for the pipe **62** in the apparatus of Bam et al., on the basis of suitability for the intended use and absent showing any unexpected results thereof, because the rearrangements of parts merely involves ordinary skill in the art, and the placement of the pipe **62** according to Bam et al. or as instantly claimed would serve the identical function of recycling recovered reagents to the reaction zone **22**.

Regarding claim 35, Bam et al. (FIG. 1) essentially discloses a flash reactor (i.e., vessel **30**, which divides stream **29** into two phases) downstream of the reaction section **22** for evaporating surplus alcohol (i.e., recycled via line **62**).

4. Claim 4 is rejected under 35 U.S.C. 103(a) as being unpatentable over Bam et al. (US 5,424,467) in view of Assmann et al. (US 5,514,820) **OR** Nouredдини (US 6,015,440), as applied to claims 1 and 3 above, and further in view of Borck et al. (US 2,583,206).

The collective teachings of Bam et al. and Assmann et al.; **OR** Bam et al. and Nouredдини; are silent as to the static mixer pipe being filled with balls. In any event, it would

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have been obvious for one of ordinary skill in the art at the time the invention was made to substitute a static mixer comprising balls for the static mixer as taught in the modified apparatus of Bam et al., on the basis of suitability for the intended use and absent showing any unexpected results thereof, because the use of ball-type static mixers for providing turbulent mixing of fluids, without back-mixing, is well known in the art, as evidenced by Borck et al. (see FIG. 1-3), and furthermore, the substitution of known equivalent structures merely involves only ordinary skill in the art, *In re Fout* 213 USPQ 532 (CCPA 1982); *In re Susi* 169 USPQ 423 (CCPA 1971); *In re Siebentritt* 152 USPQ 618 (CCPA 1967); *In re Ruff* 118 USPQ 343 (CCPA 1958).

5. Claims 13 and 24 are rejected under 35 U.S.C. 103(a) as being unpatentable over Bam et al. (US 5,424,467) in view of Assmann et al. (US 5,514,820) **OR** Nouredдини (US 6,015,440), as applied to claims 1 above, and further in view of Kiehtreiber (EP 0 535 290).

Bam et al. is silent as to whether the separation unit may comprise a filtration unit. In any event, it would have been obvious for one of ordinary skill in the art at the time the invention was made to select a filtration unit for the separation unit in the apparatus of Bam et al., on the basis of suitability for the intended use, since the substitution of one known equivalent technique for another may be obvious even if the prior art does not expressly suggest the substitution, *Ex parte Novak* 16 USPQ 2d 2041 (BPAI 1989); *In re Mostovych* 144 USPQ 38 (CCPA 1964); *In re Leshin* 125 USPQ 416 (CCPA 1960); *Graver Tank and Manufacturing Co. v. Linde Air Products Co.* 85 USPQ 328 (USSC 1950). The separation of oil from glycerol according to filtration is well known in the art, as evidenced by Kiehtreiber. In particular, Kiehtreiber teaches an apparatus for the continuous production of fatty acid esters, wherein supplies of fat 2, catalyst 3 and alcohol 4 are reacted in a through-flow, pressure resistant transesterification reactor 7 to

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generate a product stream that is purified in a separation unit comprising a flash separator **9** for evaporating alcohol for recycle via line **13**; a centrifugal separator **10**; and a filtration unit **15**.

(English abstract; German page 2, line 49 to page 3, line 4; page 3, line 35 to page 4, line 4;

Figure). A filtration unit inherently comprises a multiphase filter, as it is used for the separation of two phases (i.e., the separate phases in stream **16** and stream **17**).

6. Claims 14-23 are rejected under 35 U.S.C. 103(a) as being unpatentable over Bam et al. (US 5,424,467) in view of Assmann et al. (US 5,514,820) **OR** Nouredдини (US 6,015,440) **AND** Kiehtreiber (EP 0 535 290), as applied to claim 13 above, and further in view of Muraldihara et al. (US 5,482,633).

Regarding claims 14, the collective teachings of Bam et al., Assmann et al. and Kiehtreiber; **OR** the collective teachings of Bam et al., Nouredдини and Kiehtreiber; are silent as to the filtration unit comprising a surface filter having a membrane. In any event, it would have been obvious for one of ordinary skill in the art at the time the invention was made to select an appropriate filter means (such as the membrane instantly claimed) for the filtration unit in the modified apparatus of Bam et al., because substitution of known equivalent structures involves only ordinary skill in the art. *In re Fout* 213 USPQ 532 (CCPA 1982); *In re Susi* 169 USPQ 423 (CCPA 1971); *In re Siebentritt* 152 USPQ 618 (CCPA 1967); *In re Ruff* 118 USPQ 343 (CCPA 1958). In particular, an appropriate filter means is illustrated by Muraldihara, who teaches a unit for separating glycerides from oils, comprising a surface filter as defined by a membrane filtration system having a membrane module **210** (FIG. 2; column 5, lines 62-16).

Regarding claim 15, 17-20 and 23, Muraldihara et al. teach membrane module **210** comprises a filter which may be made from a porous carrier and appropriate coatings, including

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the materials of aluminum, silicon and water, zirconia, silica, titania, carbon and glass, said filter acting as a ceramic membrane. Other appropriate materials include sintered metal oxides and hydroxides, including sintered alumina, sintered ceramics, and microporous glass. (column 3, lines 26-38; column 4, lines 7-20). Inherently, the membrane would exhibit at least one of lipophilic, hydrophilic and amphoteric properties, depending on the selected materials, and inherently, the membrane comprises a molecular sieve membrane or a molecular sieve filter, as evidenced by the filter structure having a molecular pore size.

Regarding claim 16, although Muraldihara et al. is silent as to the specific configuration of the porous carrier, it would have been an obvious design choice for one of ordinary skill in the art at the time the invention was made to select an appropriate configuration (such as a pipe configuration) for the surface filter in the modified apparatus of Bam et al., on the basis of suitability for the intended use, since pipe shaped membranes are well known in the art, and furthermore, it has been held that changes in shape involves only ordinary skill in the art.

Regarding claims 21 and 22, Muraldihara et al. teaches the membrane module **210** may comprise a filter having a pore size from about 0.1 to about 10 microns, and preferably from about 0.1 to about 0.5 microns (column 4, lines 7-20).

Response to Arguments

7. Applicant's arguments with respect to claims 1, 3-5, 13-32 and 35 have been considered but are moot in view of the new ground(s) of rejection.

Conclusion

Any inquiry concerning this communication or earlier communications from the examiner should be directed to Jennifer A. Leung whose telephone number is (571) 272-1449.


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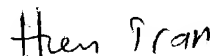
The examiner can normally be reached on 8:30 am - 5:30 pm M-F, every other Friday off.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Glenn A. Caldarola can be reached on (571) 272-1444. The fax phone number for the organization where this application or proceeding is assigned is 703-872-9306.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see <http://pair-direct.uspto.gov>. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free).

Jennifer A. Leung

November 24, 2004 



HIEN TRAN
PRIMARY EXAMINER